Simulator Maintenance & Modernization and Simulation-Assisted Engineering

THE COMPREHENSIVE CHOICE TO OPTIMIZE YOUR NUCLEAR TRAINING SIMULATORS

Westinghouse

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Simulation Services

The simulator is a strategic asset for the complete life cycle of the plant

Simulator Development

Simulator Assisted Engineering

I&C Modernization Services

Simulator Operation

Simulator-Based Training

Maintenance & Upgrades

Consulting Services

Simulator Maintenance

Standard

Our Simulators are certified by the Regulatory Body according to the ANSI/ANS-3.5 2018 & ANSI-3.5.1 20xx Working Groups. Spanish Utilities are represented by Westinghouse/Tecnatom in the ANSI-3.5 2018 Working Group and in the Utility Simulators Users Group.

Main Activities

- Operation and management of simulators
- Analysis and implementation of plant modifications
- Simulator testing and validation
- Assure full availability 24/7
- Routine corrective HW and SW maintenance
- Daily operational readiness tests
- Technology upgrades
- Simulator configuration management

Simulator Maintenance Services

- Methodology and rigor in the control of the simulator configuration.
- Regular periodic maintenance of key components.
- Preventive maintenance to avoid future problems and ensure availability during courses.
- Repair and replacement of defective / worn components.
- Extensive stock or prototyping and manufacture of obsolete components.
- Corrective or modifying software and hardware upgrades to improve accuracy, physical fidelity and functionality.
- Verification and validation of software and hardware upgrades.
- Documentation and traceability of changes.

Simulator Fleet Modernization Objectives

Assure Long-Term Operation (SW/HW Obsolescence)

- Old HW computers, OS UNIX & Old WINDOWS (non-supported by Microsoft and a Security Threat)
- Old I/O systems (difficult to find card spares)

Improve Simulator Maintainability and Training

- New Simulation environment and platform
- New codes/models: better behavior and simulation of new scenarios: Severe Accident
- Implementation of plant DCS (SIEMENS, OVATION...)
- Glasstops (virtual panels, soft panels)

Simulator Modernization Services

- Analysis of the needs and objectives of modernization and definition of strategies and their execution.
- Migrations from one simulation technology to another
- Portings and operating system upgrades
- Input/output system replacements
- Redesign or adaptation of complex and legacy simulation architectures
- Design, prototyping and manufacturing of new modules (instruments, equipment or panels)
- Integration of new codes, technologies and advanced features
- Upgrading of instructor workstations and improved user interfaces
- Verification and validation of changes
- Rigorous configuration control, documentation and traceability

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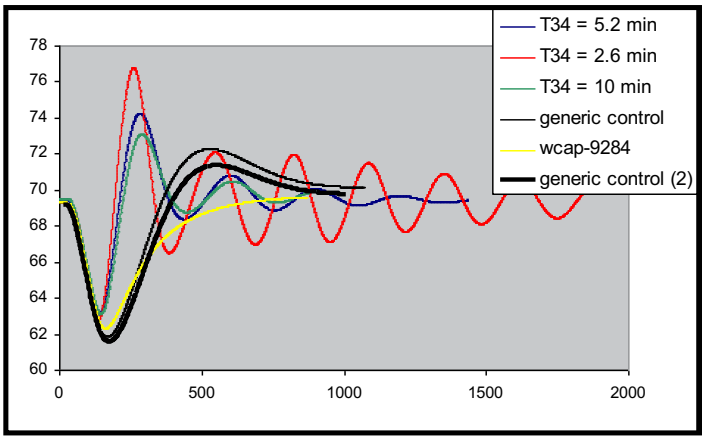
Simulation Assisted Engineering (SAE)

Engineering analysis supported by simulation platforms

- Replica full-scope simulator
- Classroom simulator
- Engineering simulator / plant analyzer
- Ad-hoc simulation models for specific objectives



Aimed at:

- Safety Analysis Support
- Operating Procedures Validation
- Assessment of Plant Design Modifications
- Validation and Tuning of new I&C digital systems
- Validation of New Operation Support Systems (Computerized Procedures, Alarm Filtering, etc)
- Validation of New Control Rooms (HFE / HSI systems)

Simulation Assisted Engineering Services

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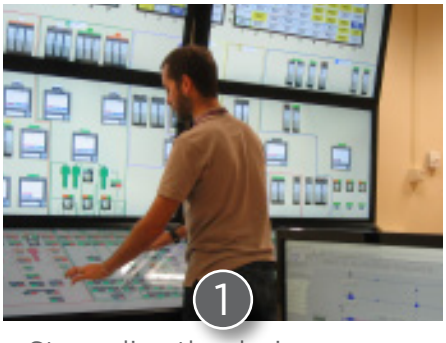
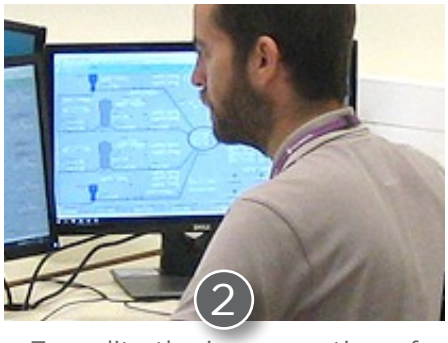
- Rigorous configuration control, documentation and traceability

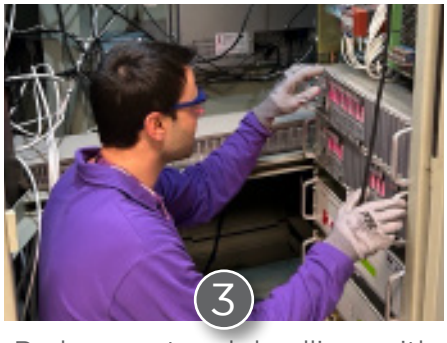
Explore the added value of Westinghouse in LTO plans and large-scale I&C Modifications



Streamline the design process (dynamics HMI, controllers...) with simulation support and virtual commissioning



Expedite the incorporation of design modifications in the FSS, thanks to better coordination and integration between real plant and simulator projects



Reduce cost and deadlines with comprehensive management of simulation assets

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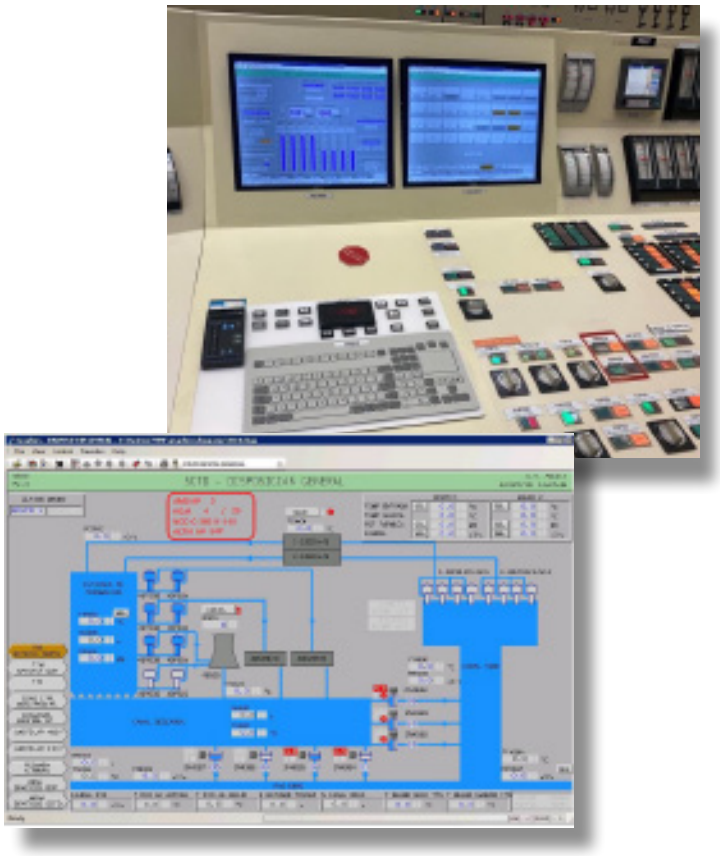
I&C References

OVATION Early Installation in Full Scope Simulators. Experience since 1998.

Almaraz FSS	• DEH/SCDR/FWC/MSR • PPC	Stimulation Virtual Stimulation	OVATION 2.3 OVATION 3.2
Angra I PTS	• PWCS	Virtual Stimulation	OVATION 3.2
Angra I FSS	• PWCS • DEH	Emulation + Simulation Emulation + Simulation	OVATION 3.2 OVATION 3.2
Ascó FSS	• BOP / DEH • SCDR • PPC	Emulation Emulation Emulation	OVATION 3.5 OVATION 3.3 OVATION 3.3
Vandellos II FSS	• EI / DEH • PPC • SCDR	Virtual Stimulation Virtual Stimulation Emulation	OVATION 3.0 OVATION 3.5 OVATION 3.5
Vandellos II Classroom Sim	• EI / DEH • PPC • SCDR	Emulation + Simulation Emulation + Simulation Emulation + Simulation	OVATION 3.0 OVATION 3.5 OVATION 3.5
Almaraz Classroom Sim	• DEH/SCDR/FWC/MSR • PPC	Simulation Simulation	OVATION 2.3 OVATION 3.2
Angra I Classroom Sim	• DEH / FWCS	Emulation + Simulation	OVATION 3.2
Ascó Classroom Sim	• BOP / DEH • SCDR • PPC	Emulation + Simulation Emulation + Simulation Emulation + Simulation	OVATION 3.3 OVATION 3.3 OVATION 3.3



Platforms with WE-SIMIX

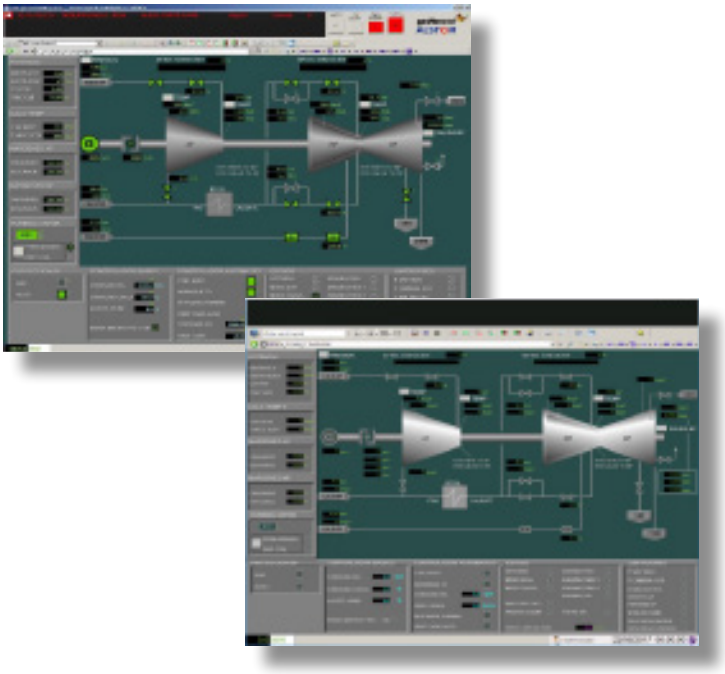
Platform*	Plant	Type	Ovation
SimExec	AP1000	Stimulation/Simulation	3.3.1
OpenSim	Byron/Braidwood	Stimulation/Simulation	3.6/3.5.1
T-REX	Catawba	Virtual Stimulation/Simulation	3.0.4
L3-MAPPS	Koeberg	Stimulation/Simulation	3.1.3
Orchid	McGuire	Virtual Stimulation/Simulation	3.0
3KeyMaster	Barakah	Simulation	3.5.1
GENUS	Lufeng	Stimulation/Simulation	3.5.1
TeamK	Vandellos	Stimulation/Simulation	3.5.1
Chattanooga	Limerick	Simulation	3.3.1
OpenSim	Nine Mile Point	Simulation	3.6
Tecnatom	Almaraz	Stimulation	3.2
3KeyMaster	Shin Kori	Virtual Stimulation	3.2

References with OVATION in FSS. Most of them supported with SAE methodology and previous installation in the simulator to support the system commissioning and advanced training.

Westinghouse Simulator MIX of products compatible with all major model vendor platforms. We offer three different high-fidelity simulator Instrumentation & Control (I&C) solutions for Ovation® and Common Q™ control systems: Full Simulation/Emulation, Stimulation and Hybrid.

- WE-SIMIXSFT – Used with Stimulated Ovation Simulator Systems
- WE-SIMIXoc – Used to Simulate the Ovation Control Logic
- WE-SIMIXCQ – Used with Stimulated Ovation Simulator Systems
- WE-SIMIXHMI – Simulates the Ovation Operator Interface Applications

4 Other DCS References



General Electric					
• Mark VI		VST			
• Mark VIe		VST			
• IFIX	ST				
Rolls Royce					
• PAMS		VST			
Honeywell					
• Experion	ST				
Siemens					
• SPPA-T2000	ST	VST		AS	
• AWL S7				AS	
• APACS			E		
Mitsubishi					
• DIASYS Netmation				AS	
ABB					
• ADVANT				AS	MS
METSO					
• METSO DNA				AS	MS
Wonderware					
• Intouch V					MS

5 Success Cases

Latin America Nuclear Full-Scope Simulators

- ATUCHA-II Simulator maintenance & updates
- ATUCHA-I Classroom simulator update
- ANGRA-1 Simulator maintenance & updates
- ANGRA-2 Input/output system replacement
- LAGUNA VERDE Simulator maintenance

French Nuclear Simulator Fleet

Framework agreement for 900 and 1300 nuclear simulators:

18 nuclear FSS in France | HW upgrades | SW modifications

Spanish Nuclear Simulator Fleet

- Westinghouse owns and maintains the Spanish fleet of 5 full scope simulators in accordance with international standards.
- Own simulation tools (TEAM_SUITE®) and strict configuration control (CMS: Configuration Management System).
- The fleet is used mainly for training, but also for engineering purposes, contributing to digitization of industrial processes and increased reliability via Digital Twins.

Main Activities:

- Operation and Management of Simulators
- Analysis and implementation of plant modifications
- Simulator testing and validation
- Routine corrective HW and SW maintenance
- Assure full availability anytime anywhere
- Daily Operational Readiness Tests
- Technology upgrades
- Simulators Configuration Management

Why Westinghouse?

Unique expertise involving development, operation and maintenance of power plant simulators.

Training-oriented point of view endorsed by worldwide experience as a training center.

State-of-the-art power plant simulation technology.

Different cost-effective solutions depending on customer needs.

Active corporate R&D policy to continuously upgrade simulation technology.

Application of our own concepts and methodology supported by leadership in Human Factor Engineering, Operations and our user's experience.

Proven track record of long-term customer relationshisp and lifetime simulation support.

Extensive experience in simulator fleet management, enabling optimization, efficiency and cost reduction.

Westinghouse

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